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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/446,144	03/02/2000	CARLO RUBBIA	P5634	1854
51500 7590 12/10/2008 PATZIK, FRANK & SAMOTNY LTD. 150 SOUTH WACKER DRIVE SUITE 1500 CHICAGO, IL 60606			EXAMINER GREENE, DANIEL LAWSON	
			ART UNIT	PAPER NUMBER
			3694	
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			12/10/2008 PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/446,144	RUBBIA, CARLO	
	<b>Examiner</b>	<b>Art Unit</b>	
	DANIEL L. GREENE	3694	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-6,8-17,19-22 and 24-48 is/are pending in the application.
- 4a) Of the above claim(s) 10,11,13-16,26,27,29,30 and 33-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-6,8,9,19-22,24,25,28,31 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)<br>2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)<br>3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____.<br>5) <input type="checkbox"/> Notice of Informal Patent Application<br>6) <input type="checkbox"/> Other: _____. |
|--|--|

### **DETAILED ACTION**

1. Applicant's response received 8/22/2008 is acknowledged. In said response applicant amended claims 1, 2, 4, 5, 17, 19 and 20, cancelled claim 49 and argued against the contentions set forth in the previous Non-Final Office action mailed 4/15/2008. Claims 1, 2, 4-6, 8-17, 19-22 and 24-49 were pending, of these, claims 10, 11, 13-16, 26, 27, 29, 30 and 33-48 have been previously withdrawn. Accordingly, an action on the merits of claims 1, 2, 4-6, 8, 9, 19-22, 24, 25, 28, 31 and 32 follows.

### **Response to Arguments**

2. Applicant's arguments filed 8/22/2008 have been fully considered. Applicant has overcome certain rejections from said previous Office action, however other rejections are sustained and expounded upon more fully below.

### **3. Applicant argues on page 13:**

#### **"I. The amended claims are definite and fully supported by the application.**

In addition to the arguments set forth below, Applicant herewith submits the following comments in response to the Examiner's Response to Arguments set forth in Sections 6A and B of the Office Action. While Applicant believes that the term "transparent" is fully supported by the specification and understood by one of ordinary skill in the art, without admission, Applicant has removed the term "transparent" from claims 1 and 17.

With respect to the Examiner's objection of the terms 'mostly elastic' and 'cloudy', it is respectfully submitted that the degree of elastic scattering is sufficiently defined to be understood by one of ordinary skill in the art - i.e., such that it provides a rate of progressive decrease in neutron energy that enhances neutron capture efficiency by resonance neutron capture.

In response to the Examiner's objection of claim 1 as being broader than the enabling disclosure, it is respectfully submitted that Claim 1 specifies that

activation region includes lead and/or bismuth, materials identified in the specification. Thus, the objection relating to claim 1 being broader than the enabling disclosure does not stand.

With respect to the Examiner's objection to the claim language of an inner and outer buffer region, the term "inner buffer region" in claim 1 has been replaced by the term "first buffer region" and the term "outer buffer region" in claim 5 has been replaced by the term "second buffer region"

**Response:**

**The rejections set forth in sections 14 and 15A-C of the previous Office action are withdrawn.**

**4. Applicant argues on pages 14 and 19-21:**

**"II. Bowman does not disclose an activation region as claimed.**

In addition to the arguments set forth below, Applicant herewith submits the following comments in response to the Examiner's Response to Arguments set forth in Section 6C of the Office Action to demonstrate that Bowman does not disclose an activation region according to amended claims 1 and 17.

The molten salt recirculation loop and blanket as shown in Bowman cannot be considered to be tile activation region according to revised claims 1 and 17 **since it is not made of lead or bismuth** and does not enable a slow decrease of neutron energy by elastic scattering to enhance neutron capture by resonant neutron capture." (Emphasis added)

"VIII. The claims are not anticipated by Bowman.

Claims 1, 2, 4-6, 8, 9, 12, 17, 19-20, 24, 25, 28 and 49 stand rejected under 35 U.S.C. 102(b) as being anticipated by Bowman (5,160,696). For the reasons set forth below, among others, it is respectfully submitted that Bowman does not disclose, among other things, an activation region according to amended claims 1 and 17."

**Response:**

**Applicant's arguments are untenable as Bowman CLEARLY**

**discloses that the molten salt is indeed made of BOTH Lead AND Bismuth.**

**See for example, Col. 8 lines 12-16,**

Using Eq. 6 we can reconsider thermal breeding and several other prospects for the accelerator-driven lead-bismuth molten salt target surrounded by a blanket with  
15 molten salt containing fissionable material, fertile material, material to be transmuted, etc.

Col. 11, line 12 through Col. 12, line 60, etc.

transmission of protons. Shown is a lead-bismuth eutectic mixture liquid-metal spallation target. Also illustrated is normally-closed valve 90 which drains enclosure 84 and heat exchanger/recirculating loop 86,88 15

which heavy water is suitable. Molten salt recirculation loop 94 contains the fertile or fissile materials and fission products thereof, and perhaps a tritium precursor, if tritium is to be generated. Heat exchanger 96 removes 25 heat from loop 94 and together with heat exchanger 86 may be used to power heat exchanger/electric power generation means 50 shown in FIG. 2 hereof. As will be discussed below, fission products are separated from recirculation loop 94 by processor 48 also shown in 30 FIG. 2 hereof. After further separation of the stable and short-half-life species, waste materials to be transmuted are inserted into containment means 98 for further irradiation.

Containment means 98 are located closer to the liquid-metal target enclosure 84 in order to take advantage of the somewhat higher neutron flux found in the vicinity thereof. A proposed composition for the molten salt eutectic might be a ratio of 52% by molecular weight of  ${}^7\text{LiF}$  to 48% of  $\text{BeF}_2$  for the transport of dissolved fluorine salts of the actinides or of fission 5 products into and out of the recirculation loop. An alternative composition might be 27%  $\text{UF}_4$  and 73%  ${}^7\text{LiF}$ . Another function of processor 48 is to maintain 10

**As shown above, Bowman does indeed disclose a Lead/Bismuth activation region that inherently behaves in the same manner as applicant's invention as it contains the same basic materials. Accordingly, applicant's arguments are moot as the inventions must operate in the same manner.**

**5. Applicant argues on page 15:**

III. In view of the cancellation of Claim 49, the double patenting rejection is traversed and should be withdrawn.

As set forth above, Claim 49 is cancelled. Accordingly, the rejection of Claim 49 as being a substantial duplicate of Claim 1 is traversed and should be withdrawn.

**Response:**

The rejection set forth in section 10 of the previous Office action is withdrawn.

**6. Applicant argues on pages 15-16:**

IV. Claims 1, 2, 4-6, 8, 9, 12, 17, 19-22, 24, 25, 28, 31-32, and 49 do not claim the same invention as that of claims 1-33 of prior U.S. Patent No. 5,774,514.

Moreover, the US '514 patent fails to disclose an arrangement in which the method steps of the present invention would be inherent: the US '514 patent does not describe providing an activation region made of heavy elements including lead and/or bismuth. The examiner considers main core region 128 illustrated in Figure 21 to be the activation region since it contains the fuel. However, main core region 128 is not made of lead. Although the Examiner argues that molten lead circulates through the main core, the molten lead does not form part of region 128. Instead, the document describes molten lead, acting as a coolant, passing through zone 123 which is separate to and exterior to core 121 which incorporates zones 128. Moreover, zone 123 cannot be considered to constitute the activation region of the present invention since it does not have a distribution of radioactive waste material within it. Indeed, this would be contrary to safety since the lead circulates through an external heat exchanger. Any collisions with lead in region 123 would not result in an enhanced neutron flux and slow decrease of neutron energy in activation region 128, nor an increased neutron capture by resonance neutron capture in material in the activation region as required by new claims 1 and 17. Accordingly, it is respectfully submitted that the double patenting rejection of the claims in view of the US '514 patent is traversed and should be withdrawn.

**Response:**

**Regardless of how applicant interprets the '514 patent, the Examiner has clearly shown how the claimed limitations align with the already patented claim 1 of said '514 patent. Applicant has not provided adequate evidence to overcome the Examiner allegations of double patenting. For applicant's convenience, the Examiner will expound upon said rejection below.**

Instant Application Claim 1	U.S. Patent 5,774,514 Claim 1
A method of exposing a material to a neutron flux, comprising the steps of:	A method of producing energy from a nuclear fuel material including a fertile element, comprising the steps of:

providing a first buffer region around a neutron source for providing a first reduction in neutron energy by inelastic scattering	<p>"arranging said fuel material within an enclosure also containing heavy nuclei."</p> <p>Arranging within an enclosure inherently requires "providing", as the enclosure must first be provided before anything can be arranged therein.</p> <p>The "buffer zone" reads on, for example, item 127. See, for example, Figure 20 and 21, Col. 40 lines 45-47, etc.</p>
providing an activation region around said first buffer region, the activation region being made of heavy elements including at least one of lead and/or bismuth;	<p>"arranging said fuel material within an enclosure also containing heavy nuclei."</p> <p>The "activation region" reads on the molten lead circulating through core 121 (Fig. 20) See also Figure 21 item 128. Note that the molten lead circulates through core 121, i.e. items 127-130 to remove heat. See. Col. 40 lines 27+.</p> <p>Further, see Col. 39 lines 53+ wherein it is set forth that Bismuth is a natural byproduct when Lead is bombarded by protons. So the "medium" will INHERENTLY contain both Lead AND Bismuth.</p>
distributing said material in the activation region; and	<p>"arranging said fuel material within an enclosure also containing heavy nuclei." See, for example, Figures 20 and 21 and associated text, wherein item 128 is the main core with a geometry set forth in Figures 16a and 16b (Col. 40, line 53)</p>
activating the neutron source to emit a neutron flux;	<p>"directing a high energy particle beam into the enclosure, whereby interaction of said particle beam with said heavy nuclei contained in the enclosure</p>



wherein multiple elastic collisions between the neutrons in the neutron flux and the heavy elements in the activation region result in an enhanced neutron flux in the activation region, and a rate of progressive decrease in neutron energy such that neutron capture efficiency in said material is enhanced by resonance neutron capture.	<p>produces high energy spallation neutrons;"</p> <p>"multiplying the neutrons produced by said directing step by a steadily sub-critical process of breeding of a fissile element from said fertile element of the fuel material via a beta-precursor of said fissile element and fission of the fissile element, said breeding and fission process being carried out inside the enclosure "</p> <p>Further, this limitation is inherent in the structure of the '514 patent as core 121 is filled with the same material as the instantly claimed invention, i.e. molten lead. Thus it must inherently behave in the same manner.</p>
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**Accordingly, the rejection set forth in section 11 of the previous Office action is sustained and incorporated herein by reference and restated for clarity below.**

**7. Applicant argues on pages 21 and 22:**

"Venneri does not disclose multiple elastic scattering of neutrons and a slow decrease in neutron energy in zone 22 which enhances neutron flux and neutron capture efficiency. In fact, Venneri explicitly states in col. 5, line 33, that there is no attempt to moderate neutrons in the fast neutron spectrum system based on liquid lead and that fast neutrons are supplied for utilization in a uranium enrichment blanket surrounding the system at the expense of radioactive waste in the burn apparatus. Thus, Venneri does not explicitly or inherently disclose a slow decrease in neutron energy as required by claims 1 and 17.

It is submitted that region 22 of the arrangement shown in Figure 9 would not perform the function of the activation region as defined in claims 1 and 17. In fact, the arrangement of Figure 9 would suffer from the problem outlined on page 42, lines 8 to 13 of the present application, namely that if the materials to be transmuted were directly inserted into the core, the transmutation rate would be lower. This is because the neutron flux would be concentrated at energies in which the captures by the long-lived FF's have a very small cross-section.

The Thorium fluoride blanket 34 of Figure 9 is not made of lead and thus does not constitute the activation region according to claims 1 and 17.

In the embodiment shown in Figure 1 of Venneri, the molten salt multiplying assembly is not made of lead and does not result in the claimed neutron activity, and so does not constitute an activation region in the context of the present invention as defined in claims 1 and 17. There is no disclosure of molten salt multiplying assembly exhibiting the properties of lead and bismuth (small neutron capture compared to elastic scattering cross section and small lethargy - see arguments in Section II above).

Moreover, it is submitted that the document does not inherently disclose a rate of progressive decrease in energy by elastic collisions such that neutron capture is enhanced by resonance neutron capture. If the neutrons lost energy as defined in claims 1 and 17, there would be few high energy neutrons reaching the surrounding breeding blanket and the system would not operate effectively."

**Response:**

Applicant's arguments as untenable as Venneri et al. contains the same elements as the instant invention and therefore MUST act in the same manner. Figure 9 is a top view of a cross section of the apparatus, accordingly there is not only width but also depth. Neutrons traveling away from their creation cite in all dimensions will inherently react with surrounding elements/atoms, accordingly their energies will decrease, just as in the instant application. Applicant's allegations that the neutron flux and energy level will be constant across Venneri are simply untenable as this is a naturally occurring phenomenon that cannot be stopped or disregarded.

**8. Applicant argues on page 26:**

**"XIH. Claims 1, 17 and 49 are not obvious over Stanton in view of Venneri.**

Claims 1, 17, 49 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. 3,349,001 to Stanton in view of U.S. 6,442,226 to Venneri. As set forth above, Claim 49 has been cancelled. For the reasons set forth here within, it is respectfully submitted that claims 1 and 17 are patentable over these references.

The Examiner considers the molten metal target region 20 in Figure 1 of Stanton to constitute an activation region in the context of the present invention. However, region 20 differs to the activation region defined in claims 1 and 17 in that:

(1) it does not have a distribution of material containing radioactive waste material; and

(2) it does not provide multiple elastic scattering leading to a progressive decrease in neutron energy and related enhanced neutron capture.

Even if material were to be inserted into the molten metal the resulting arrangement would suffer from the problem outlined on page 42, lines 8 to 13 of the present application, namely that the transmutation rate would be lower. This is because the neutron flux would be concentrated at energies in which the captures by the long-lived FF's have a very small cross-section.

As outlined in the previous sections, there is no teaching in Venneri which would lead to the activation region of the claimed invention.”

**Response:**

Applicant's arguments are unpersuasive as applicant has not shown that the references do not teach what the examiner has stated they teach, nor has applicant shown that the examiner's reasoning for and manner of combining the teachings of the references is improper or invalid.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

**In response to the allegation:**

“(1) it does not have a distribution of material containing radioactive waste material...” and

“As outlined in the previous sections, there is no teaching in Venneri which would lead to the activation region of the claimed invention.”

As stated on page 27 of the previous office action, "Venneri teaches in, for example, col. 1 line 25 through Col. 2 line 20 that it is known in the nuclear transmutation arts to place the material to be transmuted within an area of the reactor with the highest possible neutron flux in order to maximize the probability of neutron absorption and transmutation.

Accordingly, at the time of the invention it would have been obvious to one of ordinary skill in the art to apply the teachings of Venneri to the invention of Stanton. Such teachings would lead one to place the material containing the long lived isotopes within the molten liquid lead itself in order to minimize the loss of neutron population and maximize the transmutation rate due to the increased neutron density. "

**In response to the allegation:**

"(2) it does not provide multiple elastic scattering leading to a progressive decrease in neutron energy and related enhanced neutron capture."

Again, the material in Stanton is Lead and will act in the same manner as applicant's invention. This is a fact of nature that cannot be ignored nor changed. This act of nature is the same reason applicant uses the same materials and is inherent in the operation of Stanton. The further

a neutron moves from its' cite of creation, the less energy is will retain due to nuclear interactions with surrounding atoms/elements.

**In response to the allegation:**

“Even if material were to be inserted into the molten metal the resulting arrangement would suffer from the problem outlined on page 42, lines 8 to 13 of the present application, namely that the transmutation rate would be lower. This is because the neutron flux would be concentrated at energies in which the captures by the long-lived FF's have a very small cross-section.”

This statement is simply untenable. For arguments sake, there may be one specific and undefinable area of the device where the beam strikes the molten lead that may have specific concentrated energies, but from that point outward the energies are decreasing (diffusion coefficient). Further, neutrons are scattering throughout (everywhere in every direction) the device, accordingly there will be neutrons at many different energy levels at many different places/locations, not just those cited by applicant.

**The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.**

**Double Patenting**

**9. Claims 1, 2, 4-6, 8, 9, 12, 17, 19-22, 24, 25, 28, 31 and 32 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-33 of prior U.S. Patent No. 5,774,514 for the reasons set forth in section 11 of the previous office action mailed 4/15/2008.**

See the explanation set forth in section 6 above.

**10. Claims 1, 2, 4-6, 8, 9, 12, 17, 19-22, 24, 25, 28, 31 and 32 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 49 of copending Application No. 10/985323 for the reasons set forth in section 12 of the previous office action mailed 4/15/2008.**

It is not seen wherein applicant proffered arguments against this rejection in the response received 8/22/08.

**Claim Rejections - 35 USC § 102**

**11. Claims 1, 2, 4-6, 8, 9, 12, 17, 19-21, 24, 25 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Bowman (5,160,696) for the reasons set forth in section 16 of the previous office action mailed 4/15/08.**

See the discussion of this topic in section 4 above. Although Bowman may also be interpreted as set forth in previous Office actions (of which none are withdrawn), for

applicant's convenience the Examiner will expound upon how Bowman also reads on the claimed invention.

**Bowman clearly discloses claims 1 and 17**, i.e. a method of exposing a material to a neutron flux( and hence produce a useful isotope), comprising the steps of:

providing a first buffer region around a neutron source for providing a first reduction in neutron energy by inelastic scattering (this limitation is met by the molten Lead-Bismuth (Pb-Bi) circulating through enclosure 84. That is, any Pb-Bi that surrounds the point of neutron generation (i.e. neutron source) is considered the first buffer);

providing an activation region around said first buffer region, the activation region being made of heavy elements including at least one of lead and/or bismuth (this limitation is met by the Molten Salt (which is made up of Pb-Bi, see for example, Col. 11 lines 37-44.);

distributing said material in the activation region (see for example, Col. 11 lines 22-25, 37-44, etc.); and

activating the neutron source to emit a neutron flux (see for example, Col.11 lines 2-6).

Regarding the last limitation, i.e. wherein multiple elastic collisions between the neutrons in the neutron flux and the heavy elements in the activation region result in an enhanced neutron flux in the activation region, and a rate of progressive decrease in neutron energy such that neutron capture efficiency in said material is enhanced by resonance neutron capture, this limitation is inherent to the physical properties of the

elements that comprise the system. That is, Bowman is made of and uses the same constituent elements and substances as the instant invention, accordingly is MUST operate and be affected in the same manner.

Regardless of what other elements are found within the molten salt in loop 94, the heavy elements of lead and or bismuth will act in Bowman in the same manner as in the instant application as such is a law of nature (i.e. nuclear interactions)

**Regarding claim 2** and the limitation wherein the distance occupied by the first buffer region and the activation region between the neutron source and the exposed material is at least one order of magnitude larger than the diffusion coefficient for elastic neutron scattering within the diffusing medium, resort may be had to Figure 4.

**Regarding claims 4, 6, 19 and 21**, Bowman clearly discloses providing a neutron moderator (deuterated water) around the activation region where the exposed material is distributed in for example, figures 2 and 4, item 44 and associated text.

**Regarding claims 5 and 20**, Bowman clearly discloses providing a second buffer region, made of said heavy elements free of the exposed material, located between the moderator (44) and the activation region where the exposed material is distributed in, for example, figures 2 and 4 wherein it is understood that during startup, when the molten salt circulation through recirculation loop 94 has not been mixed with isotopes for transmutation. That is, the Pb-Bi salt in said loop 94 acts in the same manner as in applicant's invention. Accordingly that Pb-Bi salt material located between containment means 98 and moderator 44 reads on a second buffer region.



**Regarding claims 8, 12, 24 and 28**, see for example, Col. 11 lines 1+, Figures 2 and 4 and associated text, etc.

**Regarding claims 9 and 25**, See fig 4 and corresponding text description (See, for example, col. 11 lines 1+)

While patent drawings are not drawn to scale, relationships clearly shown in the drawings of a reference patent cannot be disregarded in determining the patentability of claims. See In re Mraz, 59 CCPA 866, 455 F.2d 1069, 173 USPQ 25 (1972).

**12. Claims 1 and 17 are rejected under 35 U.S.C. 102(a) as being anticipated by US 6,442,226 to Venneri et al. (Venneri) for the reasons set forth in section 18 of the previous office action mailed 4/15/2008.**

See the explanation set forth in section 7 above.

**Claim Rejections - 35 USC § 103**

**13. Claims 6, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowman ('696) as applied to claims 1, 2, 4-6, 8, 9, 12, 17, 19-21, 24, 25 and 28 above and further in view of Borst (3,197,375) for the reasons set forth in section 18 of the previous office action mailed 4/15/2008.**

**14. Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowman ('696) as applied to claims 1, 2, 4-6, 8, 9, 12, 17, 19-21, 24, 25 and 28 above and**

**further in view of Ruddock (4,123,497) for the reasons set forth in section 19 of the previous office action mailed 4/15/2008.**

**15. Claims 1 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,160,696 to Bowman in view of US 6,442,226 to Venneri for the reasons set forth in section 20 of the previous office action mailed 4/15/2008 as expounded upon in sections 4, 7, 11 and 12 above.**

**16. Claims 1 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 3,349,001 to Stanton in view of US 6,442,226 to Venneri for the reasons set forth in section 21 of the previous office action mailed 4/15/08 as expounded upon in section 8 above.**

### **Conclusion**

17. This application contains claims 10, 11, 13-16, 26, 27, 29, 30, 33-48 drawn to an invention nonelected with traverse in the reply filed on 6/24/2002. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL L. GREENE whose telephone number is (571)272-6876. The examiner can normally be reached on Mon-Thur.

20. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James P. Trammell can be reached on (571) 272-6712. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

21. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. L. G./  
Examiner, Art Unit 3694  
2008-12-06

/James P Trammell/  
Supervisory Patent Examiner, Art Unit 3694